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| 10/555,099 | 11/02/2005 | Celine Escoffier | 279532US0PCT | 9427 |

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| EXAMINER |
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FERNANDEZ, SUSAN EMILY

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| ART UNIT | PAPER NUMBER |
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1651

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02/02/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. 10/555,099 | Applicant(s) ESCOFFIER ET AL. | |
| | Examiner SUSAN E. FERNANDEZ | Art Unit 1651 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/27/10</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

The response filed May 27, 2010, has been received and entered.

Claims 1-12 and 27 are pending and examined on the merits.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4-7, 12, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Thorp et al. (US 5,871,918).

Thorp et al. discloses a microelectronic device comprising a microelectronic substrate having first and second faces where the conductive electrode is on the first face, and an oligonucleotide capture probe is immobilized on the first face adjacent to the conductive electrode (column 21, lines 20-27). The capture probe is spaced close to the adjacent probe, from about 0.1 to 1000 μ (column 21, lines 27-30). Thus, there is an attachment zone functionalized with a probe (an oligonucleotide) where there is an empty space separating the attachment zone with the electrode. Given that the probe is an oligonucleotide listed as a probe in instant claim 12, the oligonucleotide probe is capable of binding, according to pH, to a target so as to attach it, thus meeting the limitation of instant claim 7. Moreover the attachment zone is in the form of an electrode since an electrode can be in any form (variety of sizes and shapes).

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Figures 9 and 10 show an embodiment of the invention where separate oligonucleotide capture probes are immobilized adjacent to electrodes (column 21, lines 33-37). Given that there are multiple electrodes, each of the electrodes may be a working electrode, a counterelectrode, or a reference electrode. Furthermore, any one of the electrodes is surrounded by other electrodes as shown in the figures. Thus there is at least one counterelectrode that surrounds a working electrode, thus meeting the limitations in instant claim 2. From Figures 9 and 10, it is clear that the attachment zone and the working electrode are coplanar. Moreover, each electrode is electrically connected to a contact 23 so that the device may be wired with the necessary electronic equipment (column 21, lines 41-45). Thus, there is a means for applying a given electric current or a given potential to any of the electrodes (including a working electrode).

Claims 1, 2, 4-7, 12, and 27 are anticipated even though Thorp et al. does not specify that when the attachment zone and the electrodes are immersed in an aqueous solution, a local variation in pH occurs in the region of the attachment zone, or that the reference electrode measures the potential applied to the working electrode. There is anticipation since MPEP 2114 points out that "A claim containing a 'recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus' if the prior art apparatus teaches all the structural limitations of the claim."

A holding of anticipation is clearly required.

Claims 1, 2, 4-7, 12, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Choong et al. (US 6,238,909).

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Choong et al. teaches a device comprising a substrate, one or a plurality of microlocations on the substrate where each microlocation comprises a binding entity, two or more electrodes adapted to receive charge, and a source for providing charge to the electrode(s) (column 3, lines 37-54). The electrodes are separated from one another and from the microlocations (column 3, lines 55-61). Note that the electrodes can be in contact with the substrate (column 8, lines 42-45), where the electrodes can be placed directly on a surface of the substrate (column 9, lines 38-40). Clearly Choong et al. teaches a support (the substrate) comprising an attachment zone functionalized with a probe (the microlocations each comprising binding entities) and wherein electrodes are on the support (the substrate) bordering or surrounding the attachment zone (microlocations). Thus, the attachment zone (microlocations) and the electrodes are coplanar, as required by instant claim 27. The source for providing the charge to the electrodes of the Choong invention is considered a means for applying a given electric current or a given potential to the electrode(s). Further still, there is clearly an empty space separating the attachment zone and the electrodes since Choong requires that the electrodes are separated from the microlocations.

Given that there are multiple electrodes, each of the electrodes may be a working electrode, a counterelectrode, or a reference electrode. The electrodes can be configured as three electrodes forming a triangle in one plane (column 9, lines 62-63), thus there is a counterelectrode bordering or surrounding a working electrode, as required by instant claim 2. Also, the attachment zone is in the form of an electrode since an electrode can be in any form (variety of sizes and shapes). The binding entity present in the microlocations (attachment zone) can be an oligonucleotide, a protein, or an antibody (column 4, lines 21-30), thus meeting limitations in instant claim 12. The binding entity can comprise a probe where a hybridization

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reaction occurs to bind the probe with target nucleic acid under hybridizing conditions, such as a suitable pH (column 14, lines 3-13). Thus, the limitations in instant claim 7 are taught by Choong et al.

Claims 1, 2, 4-7, 12, and 27 are anticipated even though Choong et al. does not specify that when the attachment zone and the electrodes are immersed in an aqueous solution, a local variation in pH occurs in the region of the attachment zone, or that the reference electrode measures the potential applied to the working electrode. There is anticipation since MPEP 2114 points out that "A claim containing a 'recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus' if the prior art apparatus teaches all the structural limitations of the claim."

A holding of anticipation is clearly required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-12 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choong et al. in view of Segev (US 5,843,650).

As discussed above, Choong et al. anticipates claims 1, 2, 4-7, 12, and 27. However, Choong et al. does not expressly disclose that the binding entities are capable of binding to targets so as to attach them by an electrophilic or nucleophilic group, such as an activated ester, or an amine, or that the binding entities are chosen so that they can form with the target molecules a peptide bond.

Segev discloses a method and kit for detecting a target nucleic acid sequence which may be present in a test sample (column 5, lines 48-50). A pair of oligonucleotide probes is used, wherein one member of the pair has a nucleophilic chemical functionality group and the other pair has an electrophilic chemical functionality group (column 23, lines 46-50). The target molecule bonds with the oligonucleotide probes by chemical functionality groups (column 26, lines 20-24).

At the time the invention was made, it would have been obvious to the person of ordinary skill in the art to have used the oligonucleotide probes of Segev as the oligonucleotides binding entities of the Choong invention. One of ordinary skill in the art would have been motivated to do this since the Segev oligonucleotide probes are suitable for binding with nucleic acids. Therefore, there is attachment by an electrophilic or nucleophilic group to the target nucleic acid. It would have been obvious to have used activated ester or amine as the chemical functionality

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group of the one or more molecules on the substrate as they are known electrophilic/nucleophilic groups. Moreover, because of the different chemical functionality groups that may be used as oligonucleotide probes, it would have been obvious that different bonds, including peptide bonds, would have formed between the target molecules and the oligonucleotide probes used as the binding entity of the Choong invention. Thus, claims 8-11 are rendered obvious.

Furthermore, Choong et al. does not expressly disclose that any two electrodes (a working electrode and a counterelectrode) and the microlocation (attachment zone) are in a design selected from the group consisting of an interdigitated comb design, a spiral design, and a concentric design. However, the arrangement of the electrodes relative to the attachment zone of the Choong invention would have been a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular arrangement was significant. Moreover, Choong et al. indicates that “the electrodes can be positioned vis-à-vis the other electrodes, and vis-à-vis the substrate, in any conceivable fashion in which the devices of the invention can be constructed, and in which the methods of the invention can be carried out” (column 9, lines 34-38). Therefore, claim 3 is rendered obvious.

A holding of obviousness is clearly required.

Claims 1, 2, 4-12 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thorp et al. in view of Segev (US 5,843,650).

As discussed above, Thorp et al. anticipates claims 1, 2, 4-7, 12, and 27. However, Thorp et al. does not expressly disclose that the oligonucleotide capture probe is capable of binding to targets so as to attach them by an electrophilic or nucleophilic group, such as an activated ester,

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or an amine, or that the capture probe is chosen such that they can form with the target molecules a peptide bond.

Segev discloses a method and kit for detecting a target nucleic acid sequence which may be present in a test sample (column 5, lines 48-50). A pair of oligonucleotide probes is used, wherein one member of the pair has a nucleophilic chemical functionality group and the other pair has an electrophilic chemical functionality group (column 23, lines 46-50). The target molecule bonds with the oligonucleotide probes by chemical functionality groups (column 26, lines 20-24).

At the time the invention was made, it would have been obvious to the person of ordinary skill in the art to have used the oligonucleotide probes of Segev as the oligonucleotides capture probes of the Thorp invention. One of ordinary skill in the art would have been motivated to do this since the Segev oligonucleotide probes are suitable for binding with nucleic acids. Therefore, there is attachment by an electrophilic or nucleophilic group to the target nucleic acid. It would have been obvious to have used activated ester or amine as the chemical functionality group of the one or more molecules on the substrate as they are known electrophilic/nucleophilic groups. Moreover, because of the different chemical functionality groups that may be used as oligonucleotide probes, it would have been obvious that different bonds, including peptide bonds, would have formed between the target molecules and the oligonucleotide probes used as the binding entity of the Thorp invention. Thus, claims 8-11 are rendered obvious.

Note that it would have been obvious to have substituted the oligonucleotide probe with other probes including those listed in instant claim 12 since these probes are suitable for binding to products, thus enabling the use of the apparatus for other assays.

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A holding of obviousness is clearly required.

Response to Arguments

Applicant's arguments filed May 27, 2010, have been fully considered but they are not persuasive. The applicant asserts that Thorp does not teach the limitation in claim 1 that "...the working electrode borders or surrounds the attachment zone" given that Figure 9 of the reference shows the attachment zone, considered in Thorp to be the immobilized capture probes 22, surrounding the electrode 21. Though the electrode 21 is not surrounding the attachment zone 22, it still "borders" the attachment zone since it lies next to the attachment zone 22, which is listed as an alternative to "surrounds" in claim 1 ("borders **OR** surrounds"). According to the Oxford English Dictionary (Second edition, 1989; online version November 2010. <<http://www.oed.com:80/Entry/21618>>; accessed 27 January 2011. Earlier version first published in New English Dictionary, 1887.), one definition of the verb "border" is "To lie on the borders of, lie next, adjoin" (see definition 3). With this definition as the basis, since the electrode 21 lies next to the attachment zone 22, the electrode 21 indeed "borders" the attachment zone 22, contrary to the applicant's assertion.

The applicant also asserts that Thorp does not teach a counterelectrode as required by the claims, since each of the electrodes in Thorp are for the detection of oxidation-reduction reactions. However, the recitation of a "counterelectrode" and a "reference electrode" in the instant claims is not provided with structural limitations to differentiate these electrodes from a "working electrode." As discussed in the previous office action, any one of the electrodes is surrounded by other electrodes, wherein any of the surrounding electrodes can be considered a

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counterelectrode or a reference electrode. According to MPEP 2114, "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than functions." The fact that the Thorp electrodes are for detection of oxidation-reduction reactions does not distinguish them structurally from the recited "counterelectrode" and "reference electrode" of the claimed invention. Therefore, the counter and reference electrodes of the instant claims are indeed taught by Thorp.

Along these lines, though the Thorp electrodes are not taught as causing a local variation in pH in the region of the attachment zone when an electric current or potential is applied to a working electrode since Thorp describes their use for detecting oxidation-reduction reactions, the recitation regarding the creation of a local variation in pH is a functional limitation which does not distinguish the claimed apparatus from the Thorp apparatus. Therefore, Thorp anticipates the claimed apparatus.

With respect to Choong, the applicant asserts that the working electrode of the reference does not border or surround the attachment zone because Choong describes generally the presence of electrodes on the substrate, and embodiments which do not meet the limitations regarding positioning of the electrodes in the instant claims. To further support this assertion, the applicant points to the embodiments of the Choong invention shown in Figures 1 and 3, and cites column 10, lines 56-61 of Choong as indicating that "the electrodes do not come into contact with the sample, with the substrate and/or the buffer" wherein the electrodes are called "contactless electrodes." The applicant concludes that Choong does not describe with any specificity the working and counterelectrodes on a support in the vicinity of the attachment zone,

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in which the working electrode borders or surrounds the attachment zone, given the generalized disclosure in columns 8 and 9 regarding the embodiment of electrodes in contact with the substrate. However, it is noted that column 9, lines 38-40 indicates "For instance, at least one of the electrodes can be placed directly on a surface of the substrate, so long as it does not contact the buffer, and/or the sample contained in the buffer." The microlocations of the Choong device, which are each considered an "attachment zone," comprise porous media, such as a hydrogel pad (column 5, lines 45-52 and 64-65 and column 6, lines 30-31). Buffer solution is present on or surrounding the microlocation (column 7, lines 14-16). Therefore, in order for the electrodes not to be in contact with the buffer when placed directly on a surface of the substrate, the microlocations on the substrate surface must not be in contact with the electrodes. It is clear that the electrodes lie next to the microlocations and thus border the microlocations (see discussion above regarding the definition of the verb "border"). The recitation in the instant claims that the working electrode "borders" the attachment zone is broad, as an electrode can be considered bordering an attachment zone as long as there is no other component between the electrode and attachment zone. Contrary to applicant's conclusion, there is indeed sufficient specificity in the Choong reference to describe the positioning of the electrodes and microlocations to result in a device anticipatory of the claimed invention.

Therefore, the rejections of record must be maintained.

No claims are allowed.

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THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN E. FERNANDEZ whose telephone number is (571)272-3444. The examiner can normally be reached on Mon-Fri 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allison M. Ford/
Primary Examiner, Art Unit 1651

Susan E. Fernandez
Examiner
Art Unit 1651

sef